



Driving Up Carbon Dioxide Emissions From Road Transport: An analysis of current Government projections

July 2006

A Report for Transport 2000 by Steer Davies Gleave



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Projections

Final Report

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EXECUTIVE SUMMARY

1. Steer Davies Gleave has produced this report for Transport 2000, representing a number of organisations that contributed to the cost of the study. It examines the basis of the estimates of carbon dioxide (CO₂) emissions from road traffic made by the Government as part of their appraisals of the effects of the '10 Year Plan' for Transport and the 'Future of Transport' White Paper.
2. The level of CO₂ emissions from transport in the UK is large, and is growing both in absolute terms and as a proportion of total emissions. The Government having cut back on road-building programme in the Trunk Roads Review 1998, planned a major expansion of road capacity in the 10-Year Plan, assuming an increase of between 475-511 lane km of new roadspace. In addition to this increase, the 'Future of Transport' White Paper planned an extra 900 lane km of roadspace by 2010, rising to 4032 lane km by 2025, and also predicted traffic would grow between 2000 and 2010 by 9% more than it would have done under the 10-Year Plan. CO₂ emissions would be some 2 million (7%) tonnes per annum higher in 2010 due to the policies of the White Paper when compared with the 10-Year Plan. Also, there is evidence to suggest that that the assumptions underpinning these predictions of CO₂ emissions in the 10-year Plan and the White Paper were over-optimistic.
3. The Government's 'Targeted Programme of Improvements' to the national road network (TPI) and the modelling of the effects on CO₂ emissions that the policies and proposals of the White Paper will have are totally unrelated. The increase in CO₂ emissions of 0.1 million MtC quoted in the 'Future of Transport', is a 'top-down' estimate, and is no guide at all to the actual impact of the TPI and other policies and proposals. It should also be noted that this estimate of a 0.1 MtC increase was unchanged from that quoted by the 10-Year Plan, despite the White Paper proposing significantly more widening of roads. In addition, the modelling of both growth in traffic and CO₂ emissions in the 10-Year Plan and the White Paper are based on unrealistic assumptions, and may not therefore be relied upon.
4. The Government's Kyoto target aims to reduce greenhouse gas emissions overall by 12.5% below 1990 levels at a point between 2008 and 2012. Further domestic goals of reducing CO₂ emissions overall by 20% below 1990 levels by 2010, and putting the UK on a path to cutting emissions by some 60% by about 2050, with real progress towards this by 2020 are also set. This has been translated into a Public Service Agreement (PSA) target, which is a joint responsibility of the Department for Transport (DfT), Department of Environment, Food and Rural Affairs (DEFRA) and the Department of Trade and Industry (DTI). However, the Government has admitted that the latter domestic goals are unlikely to be achieved.
5. Voluntary agreements on new car fuel efficiency between the European Commission and car-makers are clearly seen by the Government as the most important element in achieving the PSA target, although there is a strong indication that these will not deliver the reductions expected. Similarly, the fuel duty escalator removed in 2000 will have no further effects in the future, and savings from wider transport measures implying a shift from car to other modes of transport are also not likely to be achieved given current trends.
6. Steer Davies Gleave has calculated a mid-range estimate of total CO₂ emissions from transport to 2025 would cause environmental damage to the economic value of £30.9 billion. In addition, if the Government's policies are less effective than estimated, a further £10.6 billion worth of damage may be caused.

7. In examining these figures, and other material from answers to Parliamentary questions and Freedom of Information Act requests, it has emerged that the DfT does not appear to have a clear picture of what the effects of their policies and programmes are on CO₂ emissions. This indicates they are not taking seriously the responsibilities imposed by the PSA requirement on climate change.
8. Policies and proposals that provide alternatives to road widening and road building need to be developed to manage the growth in transport emissions specifically. For example, the stricter enforcement of speed limits would appear to be a particularly cost-effective option. Policies based on 'Smarter Choices' could provide a significant reduction in the projected growth of traffic, in line with the 16% contribution to the emissions saved from transport in 2010 which the Government estimated. However, there is little evidence that such policies are being adopted sufficiently rigorously at the local level, and measures need to be put in place to encourage greater uptake of these.
9. There also appears to be significant scope to better develop other ways in which the transport policies and proposals that may be put forward at a local level could be framed in order to lessen the rate of growth in emissions, or indeed even reduce them. However, these will need to be developed as part of a coherent and targeted strategy, and in the longer-term measures to reduce the need to travel through better integration of transport and land use planning, and a focus on access to facilities rather than mobility as an end in itself will be necessary.
10. However, the key finding of this study is that the DfT needs to develop a more robust and transparent approach to the monitoring of the carbon effects of policies and proposals, particularly the Highways Agency's TPI. This should include more positive steps to better understand the consequences of its roads policies and programmes in terms of their effect on CO₂ emissions, and to identify such effects sufficiently early in the development of these so that they can better inform this process and positively affect policy outcomes. In particular, consideration should be given to sectoral targets for the reduction of CO₂ emissions relating to different parts of the economy such as transport, and spatial targets set on regional basis.

1. INTRODUCTION

Objectives and Background to the Study

1.1 Steer Davies Gleave has produced this report for Transport 2000, representing a number of organisations that contributed to the cost of the study. It examines the Government's projections of the effects of its transport policies in terms of emissions of carbon dioxide (CO₂). The study focuses on the Government's policies set out in two key transport policy documents:

- The '**10-Year Plan**' for Transport¹: This document, published in 2000, set out a long-term investment programme for transport to 2010. It explained the Government's broad vision for transport over the next 10 years and outlined its ambition to "transform Britain's transport system to make it the rival of any in Europe"; and
- The '**Future of Transport**' White Paper²: This superseded the '10-Year Plan' when it was published in July 2004, and set out a long term strategy for a modern, efficient and sustainable transport system backed up by sustained high levels of investment over the following 15 years.

The relevant policies of the Government's Climate Change Programme³ were also taken into account.

1.2 Steer Davies Gleave was asked to examine the basis of the estimates of CO₂ emissions from road traffic made by the Government as part of their appraisals of the effects of these transport policy documents i.e.:

- The '10 Year Plan' predicted overall road traffic CO₂ emissions in England would be reduced to 30.1 MtC (i.e. by 0.9 MtC) over the period 2000 - 2010; and
- The 'Future of Transport' White Paper predicted road traffic CO₂ emissions would increase by around 6% (0.8 MtC) in England over the decade to 2010, taking emissions to 31.1 MtC. However, the increase from 2000 to 2015 was estimated at just 2%, and a decrease of 3% was forecast from 2000 to 2025.

Also, 'Transport Statistics Great Britain' 2005 edition published by the Department for Transport (DfT) includes a Department of Trade and Industry (DTI) forecast that CO₂ emissions from traffic in the UK will increase by 15% from 2000 levels by 2015, compared with a 7% reduction in such emissions from all sources. These projections take account of the fuel duty escalator to 1999, the 10 Year Plan for Transport, Sustainable Distribution initiatives and the voluntary agreements with car manufacturers to cut CO₂ emissions.

1.3 Transport 2000 et al's main aim in commissioning the study was to test the DfT's assertion in 10-Year Plan that targeted road improvements will result in insignificant additional CO₂ emissions i.e. 0.1 MtC⁴. The 10-Year Plan envisaged widening 360 miles of the strategic road network, and Transport 2000 were interested in examining how many miles the present tranche of motorway schemes in the Government's

¹ Department of Environment, Transport and the Regions (DETR) (2000) - **Transport 2010: The 10-Year Plan** - July 2000, London.

² Department for Transport (2004) – **The Future of Transport** – CM6324, July 2005, London.

³ Secretary of State for the Environment, Food and Rural Affairs (2006) - **Climate Change: The UK Programme** - cm6764, the Stationary Office, March 2006.

⁴ DfT (2000) - **Transport Ten Year Plan 2000: Background Analysis** – Figure 16, pp.22– see www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_503943.hcsp

Targeted Programme of Improvements (TPI) adds up to. Transport 2000 were also keen to examine:

- How much extra capacity/extra traffic, and therefore extra CO₂ emissions, the current programme of motorway widening represents?
- To what extent does the widening programme cater for traffic growth that wouldn't otherwise happen?
- Does it cater for induced traffic that wouldn't otherwise happen?

After discussion with the clients, it was decided that the focus of the study should be the first of these points.

- 1.4 The views expressed in this report represent the views of Steer Davies Gleave and are not necessarily the views of the funding organisations.

Approach to the Study

- 1.5 The divergence between the figures on which the 10-Year Plan and the subsequent 'Future of Transport' White Paper were respectively based is clearly significant in policy terms. This study therefore set out to understand better the basis of the forecast changes in CO₂ emissions, and specifically to examine what the effect of the road-widening proposals brought forward in the White Paper and the Highways Agency's Targeted Programme of Improvements (TPI), which implements the road proposals of the White Paper, are estimated to be.
- 1.6 The first task undertaken by Steer Davies Gleave was to identify the key points of difference between the proposals in the 10-Year Plan and how this was subsequently amended by announcements following the Multi-Modal Studies⁵ and regarding the Highways Agency Programme. A comparison was then made with the approach used by the DTI (which is the basis of the predictions of CO₂ emissions reported in the Climate Change Programme and Government Transport Statistics), in an attempt to identify the key differences in the modelling work, and why there is such divergence in the two forecasts, on which a commentary is provided.
- 1.7 The next step was to look at the way transport issues are dealt with in the context of the Government's Climate Change Programme. This examines the predictions made for growth of CO₂ emissions from transport, which contrast with the reductions in all other economic sectors, and looks at the likely effectiveness of the policy actions envisaged. A 'whole-life' analysis of the transport sector is also attempted by Steer Davies Gleave, taking account of the programming of schemes and how traffic is forecast to build up over time. In this way, the assessment does not just provide a 'snapshot' of how the programme will contribute (or otherwise) to the achievement of the Government's climate change targets, but also examines what the policy implications might be in the longer term.
- 1.8 Finally, the study also looks at how the benefits of a broader range of policy options for transport could be 'locked in', and lead to a longer-term reduction in CO₂ emissions. Firstly, Steer Davies Gleave has examined the effect of stricter enforcement of speed limits in terms of CO₂ emissions. Subsequently, the implications of other policy measures have been considered for each of 'high and 'low'

⁵ DfT commissioned a programme of Multi-Modal Studies following its publication of 'A New Deal for Trunk Roads in England' in 1998. These were intended to develop sustainable long-term solutions to problems identified on key parts of the strategic road network.

assumptions about the development of 'Smarter Choices' and demand management measures such as user charging in the national context, consistent with Government policies. Other options for policies that may be pursued in seeking to achieve the Government's objectives are also examined, particularly in terms of those that could be considered at a local level.

Transport and Greenhouse Gas Emissions

- 1.9 In 2004, the transport sector was responsible for around 27% of total UK carbon dioxide emissions, and most of this came from road traffic. Emissions had risen by about 10 per cent since 1990.
- 1.10 In the most recent Climate Change Programme document⁶, the Government restates its commitment to reducing the impact of travel on the environment, and sets out its current policies aimed at reducing the fossil carbon content of fuels, increasing fuel efficiency and encouraging more environmentally friendly forms of transport.
- 1.11 The measures envisaged by the 2000 version of the Climate Change Programme are projected to save around 5.1 MtC in the UK as a whole by 2010. This chiefly comprised:
- The voluntary agreement package (including reform of company car taxation and graduated vehicle excise duty), predicted to save 2.3 MtC;
 - wider transport policies predicted to save 0.8 MtC, consistent with the 10-Year Plan forecasts;
 - sustainable distribution in Scotland saving 0.1 MtC and;
 - the fuel duty escalator (now removed) contributing a saving of 1.9 MtC.
- 1.12 The Government estimates that new measures included in the 2006 Programme relating to transport will save an additional 1.7 MtC. These measures include:
- the Renewable Transport Fuel Obligation, which will require 5 per cent of all UK fuel sales to come from renewable sources by 2010-11; and
 - further improvements to the fuel efficiency of new vehicles, through fiscal incentives and options to move beyond the present EU voluntary agreements with vehicle manufacturers after 2008.
- 1.13 Overall, the Government estimates total savings relating to transport CO₂ emissions in 2010 will amount to 6.8 MtC. It is also claimed that further, unquantified, carbon savings will be delivered through measures to help people make smarter travel choices, including using more fuel efficient vehicles.
- 1.14 The Department for Transport shares responsibility with the Department for Environment, Food and Rural Affairs and the Department for Trade and Industry for the Government's Climate Change Public Service Agreement (PSA) target. This PSA target commits DfT to working towards:
- The Kyoto target to reduce greenhouse gas emissions by 12.5% by 2008-12 over 1990 levels; and
 - The Government's domestic target to reduce CO₂ emissions by 20% by 2010 over 1990 levels.

⁶ Secretary of State for the Environment, Food and Rural Affairs (2006) – **Ibid** - pp61.

These targets do not include emissions from international aviation.

- 1.15 However, by the Government's own admission further effort is required to meet the latter domestic goal. Despite the recently announced new measures, the goal is likely to be missed by a large margin, and major policy changes are likely to be necessary to ensure the UK's progress toward a low-carbon economy by 2050.

Structure of the Report

- 1.16 Following this introductory chapter, the remainder of this report is arranged as follows:
- **Chapter 2** provides a comparison of the various Government forecasts of the growth in CO₂ emissions from transport, and gives a commentary on these.
 - **Chapter 3** specifically examines the policies and measures set out in the Government's Climate Change Programme relating to transport, and provides a 'whole life' assessment of the likely effects of this.
 - **Chapter 4** looks at the overall likely effects of measures available to reduce CO₂ emissions from transport, and examines some of the policies can be developed at a local level to support Government objectives in this area.
 - **Chapter 5** sets out Steer Davies Gleave's conclusions drawn from the study, and recommendations for action.

2. COMPARISON OF FORECASTS

Overview and Conclusions on the Government's Forecasts

Policy Context

- 2.1 There is a clear difference between the 10-Year Plan and the 'Future of Transport' White Paper in terms of policies on road building. The Government cut back on the road-building programme as a result of the review carried out in 1998⁷. However, in 2000, the 10-Year Plan added some 475 – 511 lane km of roadspace. Following this, additional schemes were included in the programme in the White Paper, which represented an extra 900 lane km of capacity to be provided by 2010, and 4,032-lane km by 2025. Notwithstanding the reiteration of other policies aimed at restraining car use, this additional capacity would be likely to lead to a continued rate of growth in traffic at a higher level than had been envisaged by the 10-Year Plan forecasts.

Traffic Forecasts

- 2.2 Because of the additional highway capacity proposed in the White Paper compared with the 10-Year Plan, together with the other changes in modelling assumptions described below, the White Paper forecasts were understandably higher than those in the 10-Year Plan. As is shown later in this section, the White Paper foresees a growth of 26% over the period 2000-2010, compared with the 17% predicted by the 10-Year Plan. Indeed, the forecasts for the White Paper foresee traffic increasing by more than the base case foreseen by the 10-Year Plan (i.e. if no policy measures had been put in place to tackle traffic growth). However, growth in traffic between 2000 and 2004 was only 6.6% overall, less than predicted by forecasts underpinning the White Paper.

CO₂ Forecasts

- 2.3 Consequently, one of the outcomes of the policy shift between the 10-Year Plan and the White Paper is that CO₂ emissions would be some 2 million (7%) tonnes per annum higher in 2010.
- 2.4 An important factor here is that in both cases, the forecasts of CO₂ emissions assume the 25% reduction in emissions from new cars by 2008 is achieved. However, recent reports⁸ indicate that vehicle manufacturers will be more than a decade late in meeting this voluntary target. If current trends continue, it is reported that the European target of reducing average CO₂ emissions for new cars to 140g/km by 2008 would not be reached in the UK until 2021. This is apparently due to market preferences for bigger, more powerful models. Recent sales of small cars fell to their lowest level for seven years last year while large vehicles secured their highest share of the market yet. This means that the average emissions of carbon dioxide for new cars fell by only 1.2 per cent in 2005. This is clearly well short of the industry target of a 5% p.a. reduction, and also significantly below the more conservative 2.5% reduction assumed in the modelling underpinning both the 10-Year Plan and the White Paper.

⁷ Department for Transport (1998) – **Trunk Roads: England** - Strategic review of the roads programme, published: 31 July 1998.

⁸ The Society of Motor Manufacturers and Traders Ltd. (2006) - **UK New Car Registrations by CO₂ Performance: Report on the 2005 Market** – April 2006.

Conclusions

- 2.5 The basic story that emerges from this examination of the Government's forecasts and predictions is as follows:
- Having cut back on road-building programme in the 1988 Trunk Roads Review, the 10-Year Plan proposed an extra 475 - 511 lane km of additional roadspace.
 - In addition to this, the 'Future of Transport' White Paper planned another extra 900 lane km of roadspace to be built by 2010, rising to 4,032 lane km by 2025.
 - Although in part due to changes in modelling assumptions, the White Paper predicted traffic would grow between 2000 and 2010 by 9% more than it would have done under the 10-Year Plan.
 - CO₂ emissions would be some 2 million (7%) tonnes per annum higher in 2010 due to the policies of the White Paper when compared with the 10-Year Plan.
 - There is evidence to suggest that that the assumptions underpinning the predictions of CO₂ emissions in the 10-year Plan and the White Paper were over-optimistic.
- 2.6 Overall, this present study indicates that the Government's 'Targeted Programme of Improvements' to the national road network (TPI) and the modelling on which the effects on CO₂ emissions that the policies and proposals of the White Paper are totally unrelated. Consequently, the increase in CO₂ emissions of 0.1 million MtC quoted in the 'Future of Transport', is a 'top-down' estimate, and is no guide at all to the actual impact of the TPI and other policies and proposals. It should also be noted that this estimate of a 0.1 MtC increase was unchanged from that quoted by the 10-Year Plan, despite the White Paper proposing significantly more widening of roads. In addition, the modelling of both growth in traffic and CO₂ emissions in the 10-Year Plan and the White Paper are based on unrealistic assumptions, and may not therefore be relied upon.
- 2.7 In the remainder of this section, the technical analysis undertaken by Steer Davies Gleave to support these conclusions is described.

Policy Context

Ten Year Plan (2000)

- 2.8 After the new Labour Government was elected in 1997, it embarked on a review of the Trunk Road Programme. The outcome of this review was the creation of the TPI and reduction of the number of strategic schemes to 37⁹. However, in 1999 the direction of Government transport policies changed, leading to production the 10 Year Plan in 2000, with a new emphasis on congestion reduction rather than managing traffic growth as a result of the fuel protests and slow progress in implementing transport alternatives. In terms of changes to the Strategic Road Network, the 10-Year Plan was set against a background of longer term land use planning and other policies aimed at helping to limit the growth in demand, focusing on a range of actions intended to tackle rising congestion. It was claimed that expansion in rail passenger and freight traffic would cut road congestion by at least 3%, and this would be coupled with:
- building bypasses to take traffic away from towns and villages and smooth traffic flows;

⁹ Department for Transport (1998) – **Trunk Roads: England** - Strategic review of the roads programme, published: 31 July 1998.

- localised schemes to optimise the performance of existing roads;
- schemes at larger junctions to reduce accidents and remove bottlenecks; and
- adding capacity to the most congested corridors, largely by widening existing trunk roads.

2.9 To deliver the strategy, the Plan included £21 billion of public and private investment in the strategic road network over the ten-year period. Specific schemes were not identified, this depending at the time on the outcome of the Multi-Modal studies and Regional Planning Strategies, although it was assumed that between 475 and 511 lane km of extra roadspace would be provided¹⁰. However, it was noted that the increased investment would enable delivery of:

- All 40 schemes then currently in the Highways Agency's 'Targeted Programme of Improvements';
- 30 trunk road bypasses;
- widening of 5% of the strategic road network (360 miles/576km) and associated junction improvements;
- 80 major schemes tackling bottlenecks at other junctions; and
- £130 million a year on smaller-scale targeted schemes, including £90 million to relieve congestion and safety hot spots¹¹.

The Future of Transport White Paper (2004)

2.10 The White Paper referred to how the Government had since 1997 significantly increased capacity of both the strategic and local road networks. In particular, it noted that the Highways Agency had completed 20 major schemes since 2002, plus the M6 Toll, and that the Agency was also taking forward a programme of smaller schemes to tackle local bottlenecks, enlarge junctions and address safety issues. At a local level, between 2000 and 2004, the Government gave provisional or full approval to 79 schemes including 28 bypasses, of which 27 had been completed and opened to traffic. Fifteen schemes were then under construction.

2.11 As with the 10-Year Plan, specific schemes were not identified, but the programme for road schemes was characterised as delivering new capacity where it was needed, assuming environmental and social costs are justified, and locking in the benefits of new capacity through various measures including some tolling and carpool lanes where appropriate. The White Paper assumed that some 1,409 lane kms in total of extra roadspace would be provided by 2010, increasing to a total of an additional 2,432 lane kms by 2015, and an additional 4,032 lane kms in total by 2025¹².

Requirements on Reporting CO₂ Emissions for Individual Highway Schemes

2.12 In England, trunk road schemes in the Government's roads programme are subject to scheme assessments. These are carried out in accordance with the advice given in the Highways Agency's 'Design Manual for Roads and Bridges' (DMRB)¹³, and

¹⁰ DfT (2000) - **Transport Ten Year Plan 2000: Background Analysis** – see www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_503943.hcsp

¹¹ DfT (2000) – **Transport Ten Year Plan 2000** – pp.5.

¹² Future of Transport assumptions - Summary of Key Inputs – Response to request for information made under the Freedom of Information Act – see www.dft.gov.uk/stellent/groups/dft_foi/documents/divisionhomepage/036818.hcsp

¹³ Highways Agency (2006) – **Design Manual for Roads and Bridges** – Volume 5: Assessment and Preparation of Road Schemes, and Volume 11: Environmental Assessment – as amended May 2006.

basically are executed in three stages, as follows:

- At **Stage 1**, the assessment is intended to identify the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies.
- At **Stage 2** assessments should identify the factors to be taken into account in choosing alternative routes or improvement schemes and to identify the advantages, disadvantages and constraints associated with those routes or schemes.
- At **Stage 3** the assessment should identify clearly the specific advantages and disadvantages of the preferred route or scheme option. A particular requirement at this stage is an assessment of the significant environmental effects of the project, in accordance with EC Directive 85/337 on environmental impact assessment.

- 2.13 It is only at Stage 3 of this process that DMRB requires CO₂ emissions of schemes to be taken into account specifically. At the earlier stages, only the effects of local pollutants (i.e. from emissions of carbon monoxide, oxides of nitrogen and particulate matter) are taken into account. This means that at key stages of the decision-making process on individual schemes, no assessment of the effect in terms of increases in CO₂ emissions may have been carried out. However, this contrasts with advice given in the Government's Transport Analysis Guidance¹⁴, which notes that *"The greenhouse gas assessment is generally undertaken at DMRB Stage 3 together with a regional assessment for emissions of oxides of nitrogen, PM₁₀, carbon monoxide and hydrocarbons. However, the greenhouse gas estimates should be undertaken for the AST at all stages of the assessment, including pre-TPI entry"*.
- 2.14 Stage 3 comes after the Government has taken a decision in principle to build a scheme, signalled by entry to the Targeted Programme of Improvements. At this point, the Government's policy commitment to build a road makes it almost impossible for objectors to challenge the principle of a scheme at a public inquiry, whatever the environmental impact that it may be predicted to cause.
- 2.15 For schemes not in the Targeted Programme of Improvements, it is mandatory for a Project Appraisal Report (PAR) to be prepared. This sets the need for a project, together with its estimated costs and benefits. A PAR is repeated at each key decision stage to provide a justification for the project's continued development and a historical record of the life of the project. The PAR assesses schemes in terms of the Government's five objectives for transport (environment, safety, economy, accessibility and integration). In relation to climate change, at the early stages the change in the total distance travelled on roads affected by the project is taken as a proxy for this. At later stages, the amount of CO₂ emitted per year as consequence of the scheme is estimated, but not until key decisions have already been made.

Traffic Forecasts

Ten Year Plan

- 2.16 The Plan forecast that, with further sustained growth in the economy and without the measures set out in the Plan, demand for travel on the strategic road network would grow by 29% over the ten years to 2010. This would lead to increased congestion, and to slower and less reliable journeys. It also noted that growth of trunk road traffic

¹⁴ www.webtag.gov.uk: see TAG Unit 3.3.5 - **The Greenhouse Gases Sub-Objective**, para. 2.3.1.

would be one of the main contributors to the forecast increase in CO₂ emissions from the transport sector.

- 2.17 The Ten Year Plan was accompanied by a Background Analysis paper¹⁵, which provides an overview of the modelling and analytical work that informed the Plan. **Table 2.1** below sets out the forecast growth in traffic in the base case, and with the measures in the plan in place:

TABLE 2.1 10-YEAR PLAN: TRAFFIC GROWTH FORECASTS

	All areas	London	Conurbations and Large Urban	Other Urban	Other Inter-urban	Trunk Roads
Baseline	22%	14%	16%	21%	24%	29%
Plan	17%	5%	10%	17%	21%	26%

The analysis indicates that the Plan would result in a 5% reduction in overall traffic growth compared with the baseline forecast, with reductions being most pronounced in areas where congestion was worst. The ratio of traffic growth to GDP growth over the Plan period was estimated at 0.6:1 (compared to around 0.8:1 under baseline assumptions).

The Future of Transport

- 2.18 Background analysis for the White Paper¹⁶ indicates that the central projection derived from the National Transport Model (NTM) was for traffic to grow by 26% between 2000 and 2010, implying an annual average increase of 2.3% over the whole decade (around 2.6% per year for the rest of the decade). The main factors behind this were stated to be falling fuel costs, increasing incomes and higher car ownership.
- 2.19 Annual growth in traffic between 2010 and 2015 was then projected to slow down to around 1.2%, due to levelling off of fuel costs, slower growth in the economy, continuing reduction in income elasticity and a saturation point in car ownership being reached. A further slowdown in growth was predicted beyond 2015 (to 0.9%) as the population ages and the proportion of the population of working age shrinks.
- 2.20 The central projections for traffic growth by area are indicated in **Table 2.2** below.

TABLE 2.2 'THE FUTURE OF TRANSPORT': CENTRAL PROJECTION TRAFFIC FORECASTS - % CHANGE ON 2000

Year	All areas	London	Conurbations & Large Urban	Other Urban	Other	Interurban Trunk Roads
2010	26%	22%	22.5%	21.5%	30%	33.5%
2015	33.5%	28%	28.5%	28%	38.5%	45.5%
2025	45.5%	40%	36.5%	39.5%	52%	60%

¹⁵ DfT (2000) - **Transport Ten Year Plan 2000: Background Analysis** - see www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_503943.hcsp#P21_5033

¹⁶ DfT (2005) - **Future of Transport – Modelling and Analysis** – see http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_036812.hcsp

2.21 As may be seen, the predictions for 2010 are all higher than was the base case for the 10-Year Plan forecasts, and indeed this is also the case for the lower-end forecasts in the range quoted in the Plan.

2.22 However, it should be noted that between 2000 and 2004, traffic in all areas was only recorded to have grown by 6.6% overall¹⁷ - i.e. significantly less than might be expected to be on track for a 26% increase by 2010. It is likely that this is because traffic growth has for some years been increasing less than GDP, contrary to the assumptions underlying the forecasts). This means that the increases in CO₂ emissions discussed below could be less than expected. However, it is also indicative of the uncertainty surrounding these predictions.

Forecasting Assumptions

2.23 An analysis of the supporting technical documents published alongside the 10-Year Plan and the White Paper indicate that there were significant differences in the assumptions underpinning the forecast growth in traffic between 2000 and 2010. These are compared in **Table 2.3** below:

TABLE 2.3 COMPARISON OF FORECASTING ASSUMPTIONS 2000-2010

	10-Year Plan	'Future of Transport'
<i>Population</i>	3.04% overall growth	3.4% overall growth
<i>Employment</i>	7.0% growth in jobs	8.4% growth in jobs
<i>Household income growth</i>	Not stated (propensity for people to travel further due to rising incomes treated as a sensitivity in low and high forecasts)	Different weights applied to sample data to capture variation in demographic characteristics across time and across spatial zones
<i>GDP</i>	26.5%	28.8%
<i>Fuel costs</i>	30% reduction (composed of 12% reduction in fuel prices and 20% improvement in fuel efficiency).	29% reduction (composed of 17% reduction in fuel prices and 15% improvement in fuel efficiency)
<i>Car purchase costs</i>	No change in car-ownership costs, non-fuel running costs or fuel duty in real terms	12% fall
<i>Driver licence holding</i>	Grows from 70% in 2000 to 75% in 2010	Grows from 70% in 2000 to 75% in 2010
<i>Highways Agency Roads</i>	A total of between 475 – 511 lane kms	An additional 1409 lane kms in total
<i>Local Roads</i>	Expenditure (both capital and revenue) on local transport policies remains at the same level as before the implementation of the Plan	£2.1bn investment corresponding to 196 lane km of additional capacity

¹⁷ DfT (2006) - **Transport Trends: 2005 Edition** – Table 1.1a.

Dealing with the Effects of Induced Traffic

- 2.24 Within the NTM, the Road Capacity and Costs Model (FORGE) module is intended to show the impact of road schemes and other road-based policies. The model calculates traffic flows, speeds, congestion, and emissions of key pollutants (including CO₂) for a sample of roads in the national network (which has extensive coverage of major roads but only a small number of minor roads). These are then grossed up to represent the total road network and total road traffic.
- 2.25 FORGE takes account of total predicted traffic growth, which is applied to a database of base year traffic levels to give future "demand" traffic flows. These are compared to the capacity on each link, and resulting traffic speeds are calculated from speed/flow relationships (which link traffic volumes, road capacity and speed) for each of 19 time periods through a typical week.
- 2.26 Changes in speed influence the costs of travel through their impact on fuel costs and time costs. As congestion grows and speeds on busy links fall, a series of elasticity-based rules are applied to redistribute traffic between links on different roads (either the same road type or a lower road type) and time periods (from weekday peak hours to the adjacent time periods). Having shifted traffic, the model recalculates speeds and produces new estimates of car journey costs. These revised costs are then fed back into the Demand Model to provide iteration and revise demand according to the available capacity and levels of congestion.
- 2.27 In this way, the model allows for additional capacity provided in the network to relieve congestion. However, at the same time this would have the effect of 'unlocking' latent demand for travel, as higher speeds would bring a reduction of travel costs, which in turn will encourage more people to travel.
- 2.28 Clearly, given the iterative nature of the modelling work, it is not possible without a specific sensitivity test to say precisely what levels the traffic forecasts from the NTM would have predicted in future years if the additional lane capacity were not provided. However, it seems likely that the additional capacity would be sure to release some suppressed demand, leading to higher traffic levels than otherwise would have been the case.

Forecasts of CO₂ Emissions

Ten Year Plan

- 2.29 The 10-Year Plan notes that, in relation to CO₂ emissions¹⁸:
- "The levels of investment in the Plan will help to develop the transport measures described in the UK's draft Climate Change Programme. Together with the 4.0MtC anticipated from the voluntary agreement with car manufacturers, they are projected to deliver savings in CO₂ emissions in 2010 equivalent to 5.6 million tonnes of carbon (MtC).*
- 2.30 The Background Analysis paper to the 10-Year Plan¹⁹ summarises the predicted effect on greenhouse gas emissions as a consequence of the Plan as indicated in **Table 2.4**

¹⁸ Department of Environment, Transport and the Regions (DETR) (2000) - **Transport 2010: The 10-Year Plan** - July 2000, London, Paragraph 8.9, pp. 59.

¹⁹ DfT (2000) - **Transport Ten Year Plan 2000: Background Analysis** (www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_503943.hcsp#P21_5033)

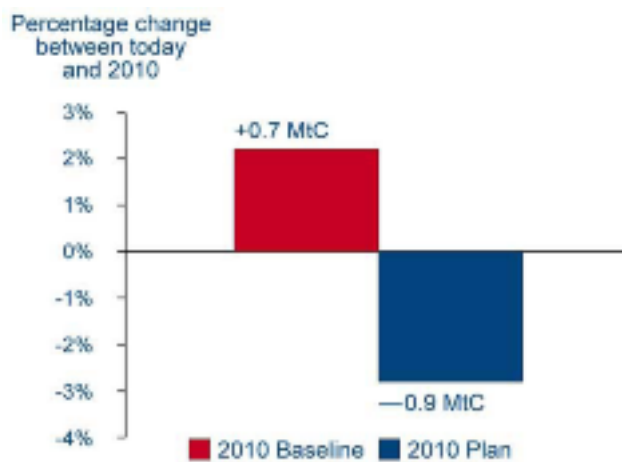
below:

TABLE 2.4 10-YEAR PLAN: FORECASTS OF GREENHOUSE GAS EMISSIONS (MTC)

	Road Traffic CO ₂ Emissions	Rail CO ₂ Emissions	Total	Saving Compared to 2010 Baseline
2000	30.3	0.7	31.0	-
2010 Baseline	31.0	0.7	31.7	-
Plan	29.1	1.0	30.1	1.6

Figure 2.1 below illustrates this point:

FIGURE 2.1 IMPACT OF THE TEN-YEAR PLAN (2000) ON ROAD AND RAIL CO₂ EMISSIONS



2.31 The Plan goes on to say that this compares with the range of 4.0 to 7.3 MtC illustrated in the draft Climate Change Programme, and that “*further savings should be achievable with additional measures under consideration, including further improvements in vehicle efficiency and new technologies.*”

Future of Transport White Paper

2.32 In Chapter 10: ‘Protecting the Environment’²⁰, the White Paper reports that:

“Transport is currently responsible for about a quarter of total UK CO₂ emissions²¹... In the short term, emissions of carbon from road transport are expected to grow by about 10 per cent from 2000 levels by 2010. This is because increased levels of traffic will offset improvements in fuel efficiency. Emissions from other sectors are due to fall in the same time period, so transport's share of total emissions is likely to increase substantially. The trends change after 2010. Slower traffic growth and continued fuel efficiency improvements are expected to produce a fall in road traffic CO₂ emissions of around 5 per cent between 2010 and 2015, with further falls thereafter.”

²⁰ 2004, DfT, White Paper: Future of Transport, Chapter 10, section 10.3 http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_031279.hcsp#P21_2338

²¹ This figure excludes international aviation, as there is currently no international agreement on ways of allocating such emissions.

- 2.33 A footnote accompanying this paragraph in the document clearly states “*The surface transport figures come from DTI’s energy projections.*” However, the background document to the White Paper²² states that the DfT’s projections of CO₂ emissions quoted in the most recent White Paper are based largely on the Department’s National Transport Model (NTM).

Specifically looking at emissions from road transport:

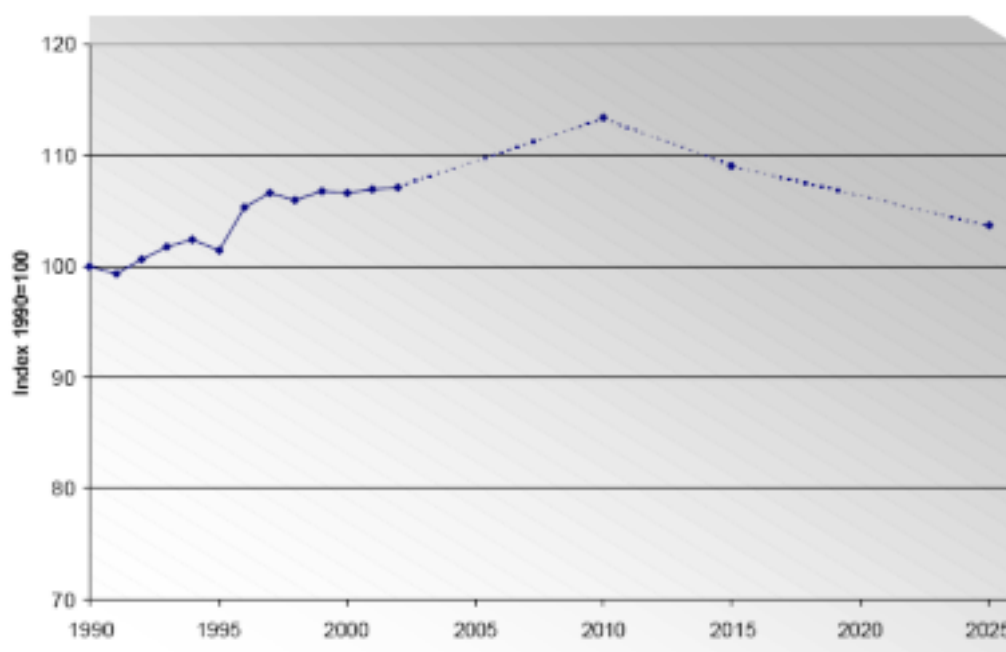
- The transport sector was then responsible for about 22% of the UK’s total CO₂ emissions (2002 estimate – excludes aviation as there is “currently no international agreement on ways of allocating such emissions”).
- The main policy for reducing carbon emissions from road transport was identified as the voluntary agreement with European, Japanese and Korean car manufacturers, which aims to reduce carbon emissions per kilometre from new cars by 25% on 1995 levels by 2008. The projections assumed a 2.5% per annum improvement between 2004 and 2008 and improvements of 1.5% a year thereafter to reflect continuing policy initiatives and technical progress.
- The impact of increased efficiency on emissions was damped because the cost per mile of motoring is reduced and thus traffic increased²³. The projections suggested that road transport CO₂ emissions will increase by around 6% in England over the decade, taking emissions to 31.1 MtC (Mega tonnes Carbon, end-user England).
- As the rate of traffic growth declines in the later years emissions were projected to fall; the increase from 2000 to 2015 was put at just 2% and a decrease of 3% forecast from 2000 to 2025.
- It should be noted that growth in traffic has actually been less than predicted between 2000-2004 (see **Paragraph 2.22** above), which places more uncertainty about the accuracy of the predictions.

An indexed graph of change in CO₂ emissions was published, and is shown in the figure following:

²² DfT (2004) - **Future of Transport – Modelling and Analysis**

²³ In response to a Parliamentary Question on 4th May 2006, Dr. Stephen Ladyman said that between 1997 and 2005 the real cost of motoring declined by 9 per cent. Bus and coach fares increased by 15 per cent. and rail fares increased by 5 per cent. – Hansard 4th May 2006, Column 1738W.

FIGURE 2.2 HISTORIC AND FORECAST ROAD TRANSPORT CO₂ EMISSIONS²⁴



Transport Statistics GB 2005

- 2.34 It is also worth noting that estimates of greenhouse gas emissions from transport sources are reported in the annual digest of transport statistics published by the DfT. These projections are taken from the DTI's Updated Energy Projections (UEP), published in November 2004²⁵. The estimates are for end users, and so include emissions arising from the production of fuels used in the transport sector. They are based on the 2004 NETCEN emission estimates, and include the effect of the 10-Year Plan and the voluntary agreements to improve fuel efficiency of new cars.
- 2.35 The most up to date statistics concerning emissions from transport were published in late 2005²⁶. The forecast from 1990 to 2020 is given in **Table 2.5** below:

TABLE 2.5 FORECAST UK CO₂ EMISSIONS BY SOURCE (1990- 2021) MtC

	1990	1995	2000	2005	2010	2015	2020
Road transport	29.7	30.1	31.7	32.4	34.5	36.5	38.2
Other transport	2.3	2.2	2.1	1.8	1.9	2.0	2.1
Rest of the economy	133	121	119	118	106	104	104
Total	165	154	153	152	142	142	144

²⁴ DfT (2004) - **Future of Transport – Modelling and Analysis** - Figure 3.10: Historic and forecast road transport CO₂.

²⁵ It should be noted that a more recent edition of this publication was published in February 2006.

²⁶ DfT et al (2005) – **Transport Statistics: Great Britain 2005** - 31st edition, October 2005, The Stationary Office, London, Table 3.7, pp. 53.

Comparisons of Forecasts

Constraints on the Analysis Undertaken

- 2.36 Steer Davies Gleave encountered a number of problems in attempting to relate the overall forecasts of traffic and emissions in the 10-Year Plan and the White Paper to the Highways Agency's Targeted Programme of Improvements (TPI), which is the key mechanism by which the plans are implemented. This was chiefly because although, as indicated in **Paragraph 2.11** above, a broad indication of the scale of the roadbuilding programme was given in both the 10-Year Plan and the White Paper, specific schemes were not identified. Also, the use of the NTM to estimate CO₂ emissions meant this was done at a strategic level, with an overall increase in capacity of the network being the basis of the predictions rather than a cumulative assessment of the impacts associated with individual schemes.
- 2.37 As an alternative, Steer Davies Gleave attempted to identify the estimated increase in CO₂ emissions on a scheme-by-scheme basis. Discussions with the DfT and the partner organisations supporting this study revealed that a number of parliamentary questions had been asked concerning this issue, and that the replies to these could provide the information necessary for such an analysis.
- 2.38 On 22nd March 2005, Lord Bridges asked what will be the net effect of the Government's road-building programme on their commitment to reduce CO₂ emissions. The reply to this by Lord Davies indicated that this would increase emissions in England by around 0.1 MtC per year in 2010, representing an increase of less than 0.5%²⁷.
- 2.39 Also, on 5 Oct 2005, Tom Brake MP asked the Secretary of State for Transport what assessments had been made of CO₂ emissions from traffic on a number of specific road schemes in the Government's programme²⁸. This followed similar questions that had been asked of the Secretary of State by Mr. Brake on 18 Jul 2005²⁹ and 13th July³⁰. Consequently, a table was placed in the Libraries of the House showing emission estimates for the Highways Agency road schemes, where that data was available.
- 2.40 However, on examining this information, it was not possible to identify a full picture of additional CO₂ emissions due to the TPI. The list of schemes for which CO₂ emissions estimates were provided differed significantly from the list of schemes for which before and after traffic data was available. Also, neither of these lists corresponded with the then-current list of TPI schemes. Overall, it emerged that no assessment of future predicted traffic levels had been made for 36% of schemes in the programme, and there was data on CO₂ emissions for less than half of these schemes³¹. This is to some extent explained by the fact that the Highways Agency's major schemes process often does not examine CO₂ emissions until Stage 3, just prior to the publication of draft Highways Act orders, as was noted in **Paragraph 2.13** above.
- 2.41 Most recently, Alistair Carmichael MP, Liberal Democrat spokesperson on transport,

²⁷ Hansard - 22 Mar 2005: Column WA27.

²⁸ Hansard – 5 October 2005: Column 2859W.

²⁹ Hansard - 18 Jul 2005: Columns 1291W - 1296W.

³⁰ Hansard - 13 July 2005 Column 1053W - Column 1056W.

³¹ Liberal Democrats (2005) - **Government Road Building Plans Will Lead Traffic To Rise By A Quarter: Brake** – Press Release, 31st October 2005.

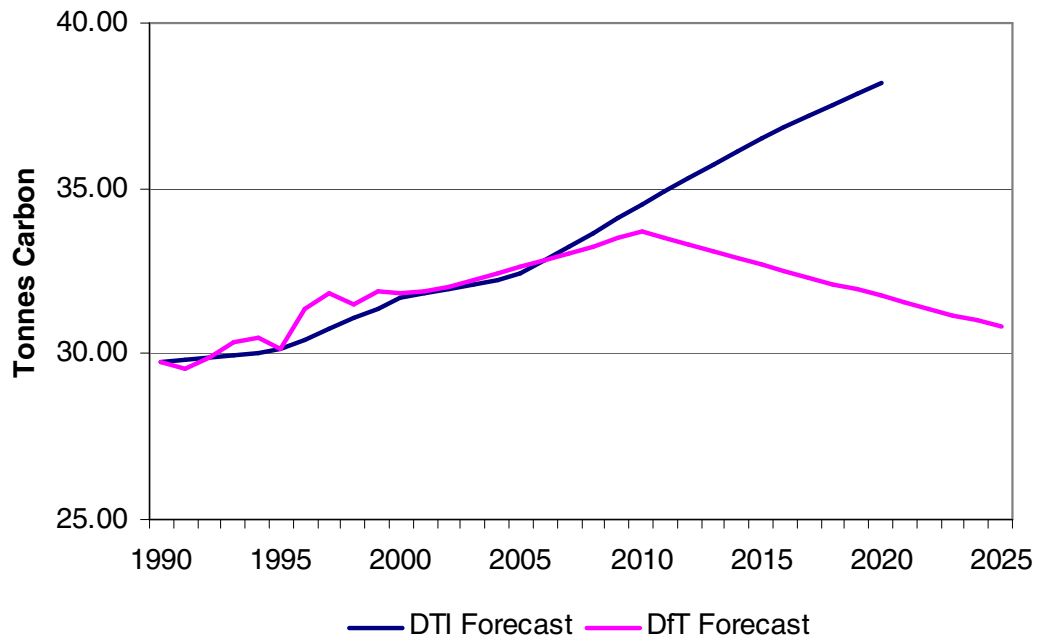
asked the Secretary of State for Transport on 4th May 2006 what the estimated CO₂ emissions from each motorway and trunk road scheme approved since 1997 were in each year of the operation of each such scheme; and what estimate he has made of the annual carbon dioxide emissions from each motorway and trunk road which is being assessed for inclusion in the roads programme³². In answer to this, Dr. Ladyman supplied a table of CO₂ emission estimates for the Highways Agency motorway and trunk road schemes, in the Targeted Programme of Improvements, which was first launched in 1998 where data is currently available. However, on examining this list, Steer Davies Gleave found that for some 32% of these schemes, no data is presently available. Dr. Ladyman also stated that schemes that have not yet entered into the Targeted Programme of Improvements (TPI) do not have this information as the proposals are still at an early stage.

- 2.42 Following on from this, Mr. Carmichael also asked the Secretary of State for Transport what requirement there is under the New Approach to Appraisal to quantify the CO₂ impact of each road scheme he approves. Dr. Ladyman replied that as part of assessing the impact of new proposals on the environment New Approach to Appraisal (NATA) requires scheme promoters to assess the impact of their proposals on greenhouse gas emissions. As CO₂ is considered to be the most important greenhouse gas, changes in CO₂ emissions are used as the key indicator for assessing the impacts of new proposals' on climate change. For all schemes that cost in excess of £5 million, which must be approved by the Secretary of State, the Department's guidance requires scheme promoters to estimate the level of CO₂ emissions in the current year and in the opening year of the scheme, both with and without the scheme in place. The change in CO₂ emissions in the opening year of the scheme is then used to provide an overall assessment of the scheme's impact on greenhouse gases. At present only carbon emissions associated with fuel consumption are considered in appraisal (see also **Paragraphs 2.12 to 2.15** above).
- 2.43 In the White Paper, it is specifically noted that the CO₂ emissions forecasts cannot be directly compared with the DTI forecasts published in the annual Transport Statistics document³³. This is because the DTI and DfT models are very different from one another in terms of coverage and approach, and DfT does not expect the projections to be identical.
- 2.44 The key difference is that the DfT forecasts are derived from the predictions of increased demand for travel taken from the National Transport Model. Emission factors are applied to the total amount of travel predicted to estimate the volume of emissions that will result. This 'bottom-up' approach allows the effect of emissions on individual measures to be considered, albeit not in detail. On the other hand, the DTI approach utilizes the UK Energy Model to project the amounts of fuel used throughout the economy, gaseous and particulate emissions and the mitigating effects several clean-up technologies. The model estimates econometrically the demand for fuels and electricity, and then presents this on a sectoral basis. Consequently, this 'top-down' approach does not readily allow the effects of specific transport policies to be taken into account.
- 2.45 **Figure 2.3** following provides a graphical comparison of the DTI forecasts and the DfT White Paper.

³² Hansard – 8th May 2006, Column 22W.

³³ DfT (2005) - **Future of Transport – Modelling and Analysis** – Footnote 8, pp.12.

FIGURE 2.3 DFT AND DTI PROJECTIONS OF CO₂ EMISSIONS FROM TRANSPORT



- 2.46 This comparison clearly indicates that, while not identical, the forecasts up to 2010 are broadly similar. However, after 2010, the forecasts published with the White Paper demonstrate a sharp decline in CO₂ emissions from road transport, while the DTI forecasts indicate that these will continue to rise.
- 2.47 The background analysis published with the White Paper indicates that the reason for the reversal in the upward trend of road traffic CO₂ emissions is the effect of the voluntary agreement with car manufacturers to reduce carbon emissions per kilometre from new cars. The DfT projections assume that there would be a 2.5% per annum improvement between 2004 and 2008 and improvements of 1.5% a year thereafter. However, this effect would be offset to some extent because it is assumed the cost per mile of motoring is reduced and traffic levels will increase as a result. The overall outcome of this is the projected 6% increase in emissions in England over the decade to 2010.
- 2.48 Beyond this, the DfT predicts that annual growth in traffic between 2010 and 2015 will reduce to about 1.2%. This is due to the assumptions that:
- the rate of reduction in fuel costs will level off, so that these do not continue to fall so rapidly;
 - the rate of growth in the economy will decelerate;
 - the income elasticity of demand for travel will continue to reduce;
 - a saturation effect slowing down growth in car ownership;
 - the population is aging and there is a reduction of the proportion of people of working age.
- 2.49 If traffic growth declines in the years after 2010 because of these effects, emissions are projected to fall at that time. This means that the overall increase in CO₂ from 2000 to 2015 would be just 2%, and from 2000 to 2025 a decrease of 3% in emissions is forecast.
- 2.50 However, although the DTI figures also include an allowance for the agreement with

car manufacturers (which the White Paper analysis identifies as “*the main policy for reducing carbon emissions from road transport*”), these estimates see the trend in emissions from road traffic continuing to increase after 2010 at a rate of about 1.1% p.a. up to 2015, and about 0.9% after this up to 2020. This incidentally is more than double the rate of increase per year in CO₂ emissions predicted for the period between 2000 and 2005.

- 2.51 It is also worth noting that, as indicated in **Table 2.3** above, the modelling work underlying both the 10-Year Plan and the White Paper assumes reducing fuel prices. However, fuel prices have recently increased significantly. For example, the most recent figures show that compared to 2004, the average price of petrol in 2005 increased by 8.1 %, whilst the price of diesel increased by 10.9 %³⁴. This is likely to have helped suppress the growth in traffic that was predicted.
- 2.52 So, notwithstanding the acknowledged discrepancies that may arise because of the different modelling approaches, there is clearly a disparity about the underlying assumptions in the growth of travel that underpins each of these.

³⁴ Department of Energy (2006) - **Quarterly Energy Prices** - URN 06/279a, March 2006, pp.53.

3. EMISSIONS FROM TRANSPORT AND THE CLIMATE CHANGE PROGRAMME

Overview and Conclusions

- 3.1 The Government's Climate Change Programme (CCP)³⁵ is designed to ensure that the UK meets the commitments made by signing the Kyoto Protocol. This (inter alia) entails reducing CO₂ emissions overall by 12.5% below 1990 levels at a point between 2008 and 2012. In addition, the UK Government has adopted the domestic goals of reducing CO₂ emissions overall by 20% below 1990 levels by 2010, and putting the UK on a path to cutting emissions by some 60% by about 2050, with real progress towards this by 2020.
- 3.2 This has been translated into a Public Service Agreement (PSA) target, which aims to link the allocation of public expenditure to the achievement of key national priorities. The current set of PSA targets for the period 2005-2008 was published in the Spending Review 2004 and the targets took effect from 1 April 2005, and specifically added a new target on climate change (PSA 7), which makes the achievement of the CCP targets noted above a joint responsibility of the DfT, DEFRA and the DTI. The CCP includes a number of policy measures relating specifically to transport, which are summarised in the following paragraphs.
- 3.3 The voluntary agreements on new car fuel efficiency between the European Commission and car-makers, which aim to improve the average fuel efficiency of new cars sold in the EU by 25 per cent by 2008-9 against a 1995 baseline, are clearly seen by the Government as the most important element in achieving the projected reductions in emissions. However, there is now a strong indication that these will not deliver the reductions expected.
- 3.4 The fuel duty escalator is also seen as an important element in the level of 2010 emissions, but although introduced in 1993, it was removed in 2000 and since then the level of fuel duties has been set on a budget by budget basis. The Government has estimated carbon savings by comparing the level of emissions with the fuel duty escalator in place with what would have happened had fuel duty been increased annually in line with inflation. However, this clearly will have no further effects in the future.
- 3.5 The savings from wider transport measures imply a shift from car to other modes of transport. However, although the use of rail continues to increase, bus patronage, cycling and walking all continue to decline presently. There is also no evidence to suggest that the increase in rail patronage has occurred due to modal shift rather than additional trips generated by economic growth. The Government's most recent compendium of transport trends³⁶ indicates, for example, that car use has continued to increase as disposable income has risen, against a backdrop of little change in the real cost of motoring and rising real costs of public transport fares. The number of bus journeys outside London has continued to decline, although rail travel has increased by over 40 per cent over the last 10 years. However, there is clear evidence that the number of trips made and distance travelled increase with income.

³⁵ Secretary of State for the Environment, Food and Rural Affairs (2006) - **Climate Change: The UK Programme** - cm6764, the Stationary Office, March 2006.

³⁶ National Statistics/DfT (2006) - **Transport Trends: 2005 Edition**.

- 3.6 Steer Davies Gleave has calculated a mid-range estimate total CO₂ emissions from transport to 2025 would cause environmental damage to the economic value of £30.9 billion. In addition, if the Government's policies are less effective than estimated, a further £10.6 billion worth of damage may be caused.
- 3.7 Overall, it would appear that the likely effectiveness of the measures set out in the CCP for meeting the targets that the Government has adopted or set itself must be questionable. The technical and fiscal measures envisaged are not being effective, or have been withdrawn. Without this, the transport policy measures were never likely to be particularly effective on their own, given the strength of underlying factors that affect travel, such as economic growth, the increase in personal disposable incomes, and the decreasing cost of motoring compared with public transport.
- 3.8 The rest of this section sets out the analysis undertaken by Steer Davies Gleave to support these conclusions.

Progress on the Climate Change Programme

- 3.9 In 1990, the UK's emissions of CO₂ were 161.5 MtC in 1990 overall and fell by about 5.6 per cent between 1990 and 2004. This was mainly due to restructuring, especially in the energy supply industry; energy efficiency; and pollution control measures in the industrial sector.
- 3.10 Presently, the Government claims that the UK is on track to meet its Kyoto Protocol target. Emissions by sources minus removals by sinks of carbon dioxide are predicted to be about 10.6% below 1990 levels in 2010. However, this means further effort is required to meet the Government's domestic goal to reduce carbon dioxide emissions by 20% below 1990 levels by 2010.
- 3.11 It should also be noted that, commenting on the fact that 'despite recently announced new measures, the Government is likely to miss its 20% carbon-reduction goal by 2010 by a large margin: the Energy Review will need to signal major policy changes to ensure the UK's progress toward a low-carbon economy by 2050'. A recent research report³⁷ indicates that:

'It is clear, from these forecasts and from its own projections that the Government's policies on carbon emissions do not yet match up to its identification of climate change as one of the most serious threats facing humanity. CO₂ emissions have risen, rather than fallen, over the past three years. The 20% goal is set to be missed by a large margin, despite having been the Government's policy since it was first elected in 1997. More seriously, there is also no sign that the UK economy is now set on a longer-term trend of emissions reduction towards the 60% cut by 2050, which was the central goal of the Energy White Paper in 2003.'

- 3.12 The report continues '*our projections have consistently suggested that the key obstacles to a low-carbon economy will be rising emissions from the transport and household sectors, which are expected to rise to almost a half of the UK's CO₂ emissions by 2010. Both these sectors... are subject to less stringent policies to constrain emissions than industry.'*
- 3.13 It concludes '*Immediate action is now needed to bring forward low-carbon generation... . This will... need... a mix of appropriate price signals and direct*

³⁷ Cambridge Econometrics (2006) – **UK Energy and Environment** – 26th May 2006.

programmes to encourage the more efficient use of energy by households and in transport, if the decarbonisation of the UK economy is to be achieved, as the 2003 Energy White Paper envisaged.'

The CCP and Transport

3.14 Transport is a key sector of the economy for the CCP, and needs to be the focus of action if the Government's goals and commitments on reducing CO₂ emissions are to be met. As was noted above, most of the reductions in CO₂ emissions in the past 15 years or so have been due to factors relating to energy generation and industrial production. Also, as has been shown in **Chapter 2**, CO₂ emissions from transport have risen consistently throughout this period, and as noted in **Paragraph 2.50** above some Government predictions see these continuing to increase after 2010 at a rate of about 1.1% p.a. up to 2015, and about 0.9% after this up to 2020 (i.e. more than double the rate of increase per year predicted for the period between 2000 and 2005).

3.15 **Table 3.1** below sets out the Government's present forecasts of total emissions and the contribution of transport.

TABLE 3.1 GREAT BRITAIN CARBON DIOXIDE EMISSIONS (MtC) 1990-2020

Sector	1990	1995	2000	2004	2010	2015	2020
Transport	39.2	39.8	40.9	43.1	44.8	45.7	45.3
Net Total emissions	161.5	149.9	149.0	152.5	144.3	149.0	146.6
% from Transport	24.3%	26.6%	27.4%	28.3%	31.0%	30.7%	30.9%

Source: Climate Change Programme, adapted from Table 5, pp.28.

3.16 In an attempt to verify this data, Steer Davies Gleave looked into using other sources of CO₂ forecasts attributed to transport. In July 1998, the DfT commissioned a programme of Multi-Modal Studies following its publication of 'A New Deal for Trunk Roads in England'. These were intended to develop sustainable long-term solutions to problems identified on key parts of the strategic road network. The 21 studies used the New Approach to Appraisal (NATA) to develop and evaluate alternative options, as set out in the Government's Guidance on the Methodology for Multi-Modal Studies (GOMMMS). Forecasting CO₂ was identified as one of the recommended outputs of this work in each of the study areas.

3.17 Having reviewed the final reports, which were issued between 2001 and 2003, Steer Davies Gleave established that the reporting of CO₂ emissions is not consistent. There are different years selected for the base year, some give CO₂ in tonnes per year, others in percentage change. The assumptions behind what is the base year seem to differ between MMSs – some are 'do minimum', some are a case of no transport measures at all, others do not specify. There is also the question of up to which year the CO₂ levels are forecast. For most of the studies forecast this is 2021, but some (such as the Cambridge to Huntingdon and the London to Ipswich MMSs), only forecast to 2016. It is therefore not possible to combine the CO₂ levels contained in the 21 Multi Modal Studies, to give an overall figure.

3.18 As can be seen in **Table 3.1** above, emissions from transport are predicted to rise from less than 25% of the total in 1990 to comprise almost 31% of the total in 2020. Transport is also the only economic sector from which CO₂ emissions are forecast to

increase rather than decrease over this period.

3.19 Specifically in relation to transport, the CCP envisages policy actions on a range of levels that aim to:

- **Reduce the fossil carbon content of road transport fuels:** The Government's Alternative Fuels Framework makes a commitment to the development of sustainable alternatives to fossil fuel, and fiscal incentives to reflect environmental benefits, such as the 20p per litre duty incentive for bioethanol and biodiesel that will be maintained to 2008-09. The Government has also announced the introduction of the Renewable Transport Fuel Obligation (RTFO), requiring suppliers to ensure a set percentage of their sales are from a renewable source. This will be introduced in 2008-09, with the obligation level set at 5% in 2010-11. Other similar measures are also being introduced.
- **Improve the fuel efficiency of vehicles:** The voluntary agreements on new car fuel efficiency between the European Commission and car-makers aim to improve the average fuel efficiency of new cars sold in the EU by 25 per cent by 2008-9 against a 1995 baseline. However, as noted in **Paragraph 2.4** above, indications are that the target is unlikely to be reached.
- **Encourage a move towards more environmentally friendly means of transport:** In line with the policies of the 10-Year Plan and 'Future of Transport' White Paper, the CCP refers to investment in public transport, policies to encourage cycling and Demand management on the road network (e.g. from simple parking measures to sophisticated road pricing schemes).
- **Develop the evidence base around the possibility of including surface transport in CO₂ emissions trading schemes in the future:** Although the Government has indicated emissions trading mechanisms could deliver carbon reductions at relatively low cost, there are many issues still to be resolved, such as the route for implementation, the regulatory burden on current and future participants, categorisation of carbon savings achieved occur within the surface transport sector itself, and the impact on carbon prices and effects on competitiveness.

3.20 **Table 3.2** below sets out the Government's estimates of the contribution that each of these measures, plus others that have been in place in the past.

TABLE 3.2 TRANSPORT POLICIES RANKED BY CO₂ EMISSIONS SAVED (MtC)

Policy	Emissions saved in 2010 (MtC)	% Contribution
Voluntary agreement package (VED, voluntary agreements, Company Car Tax)	2.3	45
Fuel duty escalator	1.9	37
Wider transport measures	0.8	16
Sustainable Distribution (Scotland)	0.1	2
Total transport	5.1	100

Source: DEFRA (2006) - Synthesis of Climate Change Policy Evaluations - pp.69, April 2006.

N.B. Savings from "wider transport measures" need to be considered in the light of the likely effects of 'smarter choices' (see **Paragraphs 4.14 - 4.20** below), concerns in some quarters that the modelling underestimates the potential for reduced traffic from combinations of measures (public transport, charging etc), and the Government's own view of the difficulties of estimating such effects accurately (See **Paragraph 4.14** specifically).

‘Whole Life’ Assessment of Carbon Emissions

- 3.21 As may be seen from this study, almost all the reporting of carbon emissions relating to transport is in terms of absolute levels on an annual basis. There has been no attempt to assess what the longer-term implications of these are over the whole life of the period covered by the Government’s various transport plans.
- 3.22 Therefore, Steer Davies Gleave has examined what the effect of emissions would be over the whole life of the ‘Future of Transport’ White Paper (i.e. up to 2025) in terms of the economic value of the damage caused.
- 3.23 The first step in this was to examine the amount of emissions predicted to occur in the background analysis to the ‘Future of Transport’ White Paper on an annual basis over the whole life of the plan. Taking 2002 as the base year, the level of emissions for each year up to 2025 was calculated on the basis of the forecast increases in traffic³⁸.
- 3.24 Next, Steer Davies Gleave assigned an economic value to these forecast levels of emissions on the basis presently recommended by DEFRA for use in cost/benefit and similar analyses³⁹. Discounting the annual values calculated on this basis over the life of the plan back to the base year of 2002 at a rate of 3.5% per annum, in accordance with current Treasury practice, provides the net present value.
- 3.25 On this basis, Steer Davies Gleave has calculated a mid-range estimate that the total CO₂ emissions from transport over the period 2002 to 2025 would cause environmental damage to the economic value of £30.9 billion. If the measures in the CCP are not as effective as the Government have indicated, and CO₂ emissions from transport continue to rise at the rate estimated by the Government as the ‘baseline’ over the period 2000-2010, this would lead to another 735 MtC being emitted, causing further environmental damage to the value of an additional £10.6 billion over the period 2002 – 2025. The full range of estimates made, reflecting the uncertainty over the proper economic value to apply, is set out in **Table 3.3** below:

TABLE 3.3 ESTIMATES OF THE TOTAL ECONOMIC VALUE OF DAMAGE FROM CARBON DIOXIDE EMISSIONS FROM TRANSPORT 2002-2025 (£ BILLION).

	Very low	Low	Medium	High
Value/tC	£19	£35	£70	£140
Total Value (£b)	£11.8	£17.8	£30.9	£59.6
Baseline value (£b)	£4.2	£6.2	£10.6	£19.2

³⁸ DfT (2004) - **Future of Transport – Modelling and Analysis** – Figure 3.8: Traffic Growth and Economic Growth.

³⁹ Government Economic Service (2002) - **Estimating the Social Cost of Carbon Emissions** – January. This paper suggested £70/tC (within a range of £35 to £140/tC) as an illustrative estimate for the global damage cost of carbon emissions, rising by £1/tC per year in real terms to reflect the increasing marginal cost of emissions over time. For the time being, this advice remains unchanged at least until the Stern Review has reported in Autumn 2006. In the meantime, DEFRA recommends that the above-mentioned range be employed in any cost-benefit analysis, applying caution where the balance may be tipped by the use of the upper or lower bound estimates. Therefore, the GES estimate of £70 per tonne of carbon (with £35-£140/tC as lower and upper bound estimates) is used in this study, together with an even lower end-of-range of £19/tC, reflecting the views of some commentators that £35/tC should be more properly considered as the mid-range estimate.

4. THE EFFECT OF MEASURES TO REDUCE CO₂ EMISSIONS

Overview and Conclusions

- 4.1 In this final section, the report examines the effect of other possible measures to reduce CO₂ emissions. These include the effect of stricter enforcement of speed limits in terms of CO₂ emissions. The implications of other policy measures such as 'Smarter Choices' and demand management measures consistent with Government policies are also discussed. Some other options for policies that may be pursued in seeking to achieve the Government's objectives are also examined, particularly in terms of those that could be considered at a local level.
- 4.2 The 'Future of Transport' White Paper identified the risk that, even if policies to promote smarter choices and network management are effective, without radical measures such as demand management, road congestion will continue to increase. It also identified local road pricing schemes as an important way to pilot technology and systems and to inform the decisions on the development of national road pricing in the longer term.
- 4.3 In principle, the Government's stated commitment in the long-term to a national road user charging scheme within 10 years, and the more specific commitment to establishing a major road pricing pilot within 4-5 years⁴⁰ might also produce significant reductions in carbon emissions.
- 4.4 Underlying this, it is worth noting that the only source of increased Government spending in real terms over the next 10 years will be the Transport Innovation Fund (TIF) announced by the White Paper (The Government has indicated TIF will grow from £290 million in 2008/09 to over £2 billion by 2014/15, while all other transport budgets will remain unchanged in real terms). Through the TIF, DfT will channel resources towards the achievement of its two highest priority objectives, i.e.:
- tackling congestion by supporting some of the costs of smarter, innovative local transport packages that combine demand management measures, such as road pricing, with measures to encourage modal shift, and better bus services; and
 - improving productivity by supporting regional, inter-regional and local schemes that are beneficial to national productivity.
- 4.5 On this basis, there is the clear potential for these DfT priorities to conflict with the PSA on meeting international commitments on limiting greenhouse gas emissions. Therefore, in taking road user charging forward the DfT needs to set out clearly the implications for carbon emissions of any scheme that is proposed. Ideally, charging should be linked with other policies such as vehicle and fuel taxation to produce a package that actively reduces carbon emissions rather than increases them.
- 4.6 In addition, given that the examination of the Government's projections and forecasts of the growth of CO₂ emissions from transport in this study has indicated that there is some uncertainty about the likely effectiveness of the Government's main policy initiatives in this area, as set out in the CCP, Steer Davies Gleave has also examined the potential for other policies to support the achievement of the Government's objectives. From this, it is concluded that:

⁴⁰ **'Better Transport'** - Speech by Rt. Hon Douglas Alexander MP, Secretary of State for Transport in York. Delivered: 10 May 2006.

- The DfT should develop a more robust and transparent approach to the monitoring of the carbon effects of policies and proposals, particularly the Highways Agency's Targeted Programme of Improvements. This requires a better understand the consequences of policies and programmes in terms of their effect on CO₂ emissions sufficiently early in the development of these so that they can better inform this process and positively affect policy outcomes.
- The more rigorous and effective enforcement of the 70 mph speed limit, or even reducing this to 60 mph, would appear to be a particularly efficient way of reducing CO₂ emissions, which according to the DfT's own figures could be as effective as all the other transport measures set out in the 10-year plan and 'Future of Transport' White Paper put together. This view is confirmed by other research that suggests the effects may be even more beneficial.
- Policies based on 'Smarter Choices'⁴¹ could provide a significant reduction in the projected growth of traffic, consistent with the Government's own estimate that 16% of savings in CO₂ emissions relating to road traffic in 2010 would be from this source. However, there is little evidence that these are being adopted sufficiently rigorously at the local level.
- There appears to be significant scope to develop better ways in which the transport policies and proposals that may be put forward at a local level could be developed in order to lessen the rate of growth in emissions, or indeed even reduce them. However, these will need to be developed as part of a coherent and targeted strategy, and in the longer-term measures will be necessary to reduce the need to travel through better integration of transport and land use planning, and a focus on access to facilities rather than mobility as an end in itself.
- Consideration should be given to sectoral targets for the reduction of CO₂ emissions relating to different parts of the economy such as transport, and spatial targets set on a regional basis.

Impact of Enforcing Speed Limits

4.7 The DfT developed a spreadsheet model to analyse the impact of changes to vehicle speed limits on carbon emissions⁴². This was released into the public domain in December 2005 when the Department received a request under the Freedom of Information Act for such information, following the publication of some data in the Guardian newspaper.

4.8 Using information from the DfT model, the following table **Table 4.1** shows how the CO₂ emissions are predicted to vary depending on the speed limits:

TABLE 4.1 IMPACTS OF SPEED LIMITS ON CARBON EMISSIONS

Speed limit (miles per hour)	Reduction in average annual carbon (MtC)			
	2010	2015	2020	2008-12
50	0.20	0.21	0.22	0.20
60	0.86	0.90	0.94	0.85
70	0.89	0.94	0.98	0.88

⁴¹ 'Smarter Choices' are measures aimed at changing behaviour and choices. They include workplace and school travel plans; personalised travel planning; information and marketing; travel awareness campaigns; teleworking; teleconferencing and home shopping.

⁴² Personal Communication with Malcolm Jay, DfT, 3rd April 2006.

- 4.9 The model works on the basis that although the speed limit on most major roads is 70mph, the average speed of vehicles is actually 76 mph, and uses the predicted level of CO₂ emissions at this higher speed as a benchmark. The model indicates that if the 70 mph limits were enforced more vigorously and effectively, there would be a reduction of just under 1MtC of CO₂ per year. If one compares this with the other estimates of the effects of policy indicated in **Table 3.2** in the previous chapter, it may be seen that the effect of 'wider transport measures' (i.e. the 10-Year Plan proposals for sustainable distribution, substantial improvements in local public transport; and 'soft measures' such as school travel plans) is estimated only to lead to a saving of 0.8 MtC in 2010, and as such would be less effective than speed limit enforcement.
- 4.10 It also should be noted that the model indicates that reducing the speed limit (together with effective enforcement) would provide less reduction in emissions than enforcement at the present 70 mph level.
- 4.11 This information is not completely compatible with other research that has been undertaken. A report for the Low Carbon Vehicle Partnership⁴³ investigated the issue further, using a model based on the DfT model that Steer Davies Gleave examined as noted above. This research indicated that if applied in 2006, a properly enforced 70mph speed limit would cut carbon emissions from transport by nearly 5 million tonnes (MtC) by 2010, averaging 0.97 MtC per annum, which is broadly consistent with the Steer Davies Gleave finding above.
- 4.12 However, this research also indicated that a new 60mph limit would double this reduction over the same period, reducing emissions by an average 1.88 MtC a year or approximately 9.4 MtC total savings over five years. Enforcing the existing speed limit for motorways and dual carriageways would cut carbon emissions from the road transport sector by 2.8% in 2010. Reducing the speed limit to 60mph and enforcing it would reduce road transport emissions by 5.4%. These savings represent between 15% and 29% of the total savings expected from the transport sector by 2010, according to the Climate Change Programme Review. They compare very favourably with other single measures, such as the 1.6MtC expected from the Road Traffic Fuels Obligation. The figures are based on projections of traffic growth which now appear to be low and do not take into account the potential for slower speeds to restrain traffic and future traffic growth. The research also noted that speed limit reduction is likely to be one of the cheapest carbon abatement policies, across all sectors, especially when ancillary benefits such as casualty and congestion reduction are taken into account.
- 4.13 However, overall it would seem that the better enforcement or reduction of speed limits would provide a very effective and cost-efficient means of managing carbon emissions from road transport, and certainly merit more serious investigation by the Government in support of achieving the targets set in the Climate Change Programme.

Impact of 'Smarter Choices'

- 4.14 As noted in **Paragraph 4.9** above, the effect of 'wider transport measures'⁴⁴ is estimated to lead to a saving of 0.8 MtC in 2010. However, having made this estimate,

⁴³ Anabel, J. et al (2006) - **Getting The Genie Back In The Bottle: Limiting Speed To Reduce Carbon Emissions And Accelerate The Shift To Low Carbon Vehicles** – The UK Energy Research Centre and the Lower Speeds Initiative for the Low Carbon Vehicle Partnership.

⁴⁴ Steer Davies Gleave has taken this to mean demand management and 'Smarter Choices', as promoted by the 'Future of Transport' White Paper.

the Government has indicated that obtaining reliable data proved too difficult and so a thorough evaluation of these measures on reducing CO₂ emissions was not carried out⁴⁵, relying instead on the National Transport Model analysis as described in **Chapter 2**.

4.15 In the interim, DfT commissioned more in-depth analysis of the traffic impacts of such measures⁴⁶, looking at earlier studies of the impact of 'Smarter Choices' type measures, new evidence from the UK and abroad, case study interviews relating to 24 specific initiatives, and practical experience of organising such schemes. The study examined two different policy scenarios:

- A 'high intensity' scenario with significant expansion of 'Smarter Choices' type measures, which would reduce urban traffic by about 21% in the peak and 13% off-peak, reduce non-urban traffic by about 14% in the peak and 7% off-peak, and provide a nationwide reduction in all traffic of about 11%.
- A 'low intensity' scenario with a continuation of 2003-4 levels of activity, which was estimated to be considerably less effective, leading to a reduction in peak period urban traffic of about 5%, and a nationwide reduction in all traffic of 2%-3%.

4.16 Overall, this could represent a significant reduction in the projected growth of traffic, for example being half of the baseline growth projected in the 10-Year Plan, and almost as substantial a portion of that predicted by the 'Future of Transport' White Paper. While admittedly this impact would most be felt in urban areas, nevertheless it would appear to be in line with the 16% contribution to the emissions saved from transport in 2010 which the Government estimated.

4.17 However, to achieve this, positive measures to promote walking, cycling, the use of public transport and to reduce the need to travel will be required. There will also need to be measures in place to avoid the capacity freed up by these means simply attracting more car use by other people, which could offset the impact of those who reduce their car use. Therefore, it is essential that other policies such as re-allocation of road capacity and other measures to control parking, calm traffic, introduce road user charging or other traffic restraint (such as pedestrianisation or bans on traffic), other use of transport prices and fares, speed regulation, or stronger legal enforcement levels are implemented. Although such measures are all consistent with present Government policy, there is little evidence that these are being adopted sufficiently rigorously at the local level.

4.18 More recent work commissioned by the DfT specifically to examine the effect of 'Smarter Choices' on carbon emissions from transport⁴⁷ indicates that under favourable policy conditions, they could result in savings of up to 2.5 million tonnes of carbon per annum in 2015, and a cumulative total of 14.2 MtC by that date. By 2010, the potential savings would represent a 16% contribution to the DfT's PSA target to reduce carbon emissions, and would equal 31% of the emissions savings currently expected from a combination of all the 10-Year Plan policies and the EU Voluntary Agreement on cleaner cars. This confirms Steer Davies Gleave's view that the estimated effect of 'Smarter Choices' is consistent with earlier estimates published by

⁴⁵ DEFRA (2006) - **Synthesis of Climate Change Policy Evaluations** - pp.69, April 2006.

⁴⁶ Cairns, S. et al (2004) - **Smarter Choices: Changing the Way We Travel** – Department for Transport, London, 20th July 2004.

⁴⁷ Anabel, J. et al (2005) - **Smarter Choices and Carbon Emissions: Scoping Study** - Department for Transport, September 2005, pp.24.

the Government.

- 4.19 This research also concludes⁴⁸ that overarching policy changes would be necessary to secure these reductions in emissions, the most important of these being:
- More flexibility for local authorities to use Local Transport Plan funds for revenue type measures;
 - Incentives and encouragement for local authorities to adopt large scale 'Smarter Choices' programmes;
 - Grants for staff in local authorities to develop large scale 'Smarter Choices' programmes;
 - Changing the guidance for the Transport Innovation Fund⁴⁹ to put more emphasis on developing 'harder edged measures' in parallel with a 'Smarter Choices' programme, to maximise the benefits of both.
- 4.20 Steer Davies Gleave's own experience in recently advising local authorities and Passenger Transport Executives on the development of their second Local Transport Plans (LTPs), and in particular undertaking Strategic Environmental Assessments (SEA) for these has indicated that the introduction of strategies based around 'Smarter Choices' and the consideration of the effects of transport policy on CO₂ emissions is extremely limited. Certainly as regards the latter, some authorities were even reluctant to accept that a stated objective of LTPs or SEAs should be to minimise the increase in CO₂ emissions so that local policies made a contribution to the achievement of national targets and Government commitments in this area. There appeared to be a feeling amongst local authorities that they were powerless to halt or reduce the overall rate of growth in traffic. Consequently, they were often reluctant to set objectives and targets the achievement of which they had no control over, and were almost certainly not going to meet.

Other Measures to Reduce Emissions

- 4.21 As was noted in **Paragraph 3.19** above, the Government's strategic policies aimed at reducing emissions from transport are to:
- Reduce the carbon content of fuels;
 - Improve the fuel efficiency of vehicles;
 - Encourage the use of 'environmentally-friendly' forms of transport; and
 - Examine the use of carbon trading in the transport sector.
- 4.22 However, at the local level, there appears to be some confusion about how transport policies may support these strategic initiatives. On this basis, it may be prudent to consider ways in which the transport policies and proposals may be put forward at a local level in order to lessen the rate of growth in emissions, or indeed even reduce them. This can be done in three main ways:
- **Avoidance or prevention:** Adopting policies at a local level in order to avoid growth in traffic by reducing the need to travel or encouraging the use of public transport, walking and cycling, or the use of rail and water to move freight.

⁴⁸ Anabel, J. et al (2005) – *Ibid* – pp. 74-75.

⁴⁹ The Transport Innovation Fund (TIF) was introduced in the 'Future of Transport' White Paper to encourage measures to reduce congestion and improve productivity. TIF will be the only source of increased Government support of local government spending on road transport in real terms in years up to 2015.

However, it is worth noting that in policy guidance to local authorities, PPG13⁵⁰ gives no explicit mention of reducing CO₂, but only encourages 'sustainable travel'.

- **Reduction:** When all alternative options or approaches to avoiding an effect have been examined, ways of reducing the extent or magnitude of the effect need to be considered. This could focus on timing or phasing of LTP measures to reduce adverse effects. An example would be re-timing of all maintenance works outside of peak periods, to reduce CO₂ emissions associated with congestion.
- **Offsetting or compensation:** If no opportunities are available to either avoid or reduce adverse effects, remedial measures can be taken. This could be financial compensation for the loss of, or damage to, environmental resources, although the scope for this might be limited in the local context. The opportunity of offsetting carbon emissions through tree planting would be an example of this.

4.23 In the local context, there are myriad measures that may be considered to achieve one or other of these ends. For example, DEFRA recommends a range of measures (including some already included in the definition of 'Smarter Choices') designed to improve local air quality that in many cases would also help reduce CO₂ emissions at the local level⁵¹. These include:

- Measures developed under the provisions of the Road Traffic Reduction Act 1997 and other traffic regulation to reduce traffic;
- Promoting the use of cleaner fuels, as advised by the Government's 'PowerShift' and 'CleanUp' programmes;
- Transport information and guidance programmes to encourage drivers to avoid congested areas at busy times;
- Road user charging and workplace parking levies;
- Testing cars at the roadside to ensure compliance with emission standards (although CO₂ emissions are not specifically covered by EURO standards, the combustion efficiency of an engine is an indicator of emissions);
- Measures to avoid stationary vehicles with engines running, e.g. reducing congestion, or requiring taxis and buses have engines turned off at ranks or stands;
- Declaring 'Low Emission Zones', where only vehicles meeting stringent emission standards are allowed to enter;
- Traffic calming measures to reduce traffic speeds and aggressive driving;
- Reallocation of road space to favour pedestrians and cyclists, with results similar to 'Home Zones' and traffic calming;
- High occupancy vehicle lanes, which only cars carrying 2 or more people are permitted to use, to encourage car sharing;
- Requiring HGV's, Buses and Taxis to use alternative fuels;

4.24 Overall, the individual measures listed here, and other similar initiatives, are not likely to be particularly effective on their own. However, a range of measures developed as part of a coherent and targeted strategy may together achieve the required improvements.

4.25 In addition, longer term measures to reduce the need to travel through better integration of transport and land use planning, and a focus on access to facilities

⁵⁰ Office of the Deputy Prime Minister (2001) - **Planning Policy Guidance 13: Transport** - Published March 2001.

⁵¹ DEFRA (2003) - **Part IV of the Environment Act 1995 Local Air Quality Management: Policy Guidance LAQM. PG(03)** - pp.6-7 to 6-20.

rather than mobility as an end in itself are available to help reduced greenhouse gas emissions overall.

- 4.26 One key problem appears to be the uncertainty and lack of clarity about what local authorities need to achieve in terms of a contribution to reducing emissions. Apart from the global targets of the Kyoto agreement and the Government's own goal, there is no clear indication of whether increases or decreases in emissions from transport achieved at a local level, or a particular road scheme, are significant at a national or global level. Sectoral targets for different parts of the economy such as transport, and even spatial targets on a regional basis (as have been developed to monitor the success of policies to promote renewable energy) would be a helpful development in this respect.

5. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Comparison of Forecasts

- 5.1 The changes in Government policy on road-building may be clearly seen by a comparison of the position set out in the 'New Deal for Transport' following the Trunk Roads Review, the 10-Year Plan and the 'Future of Transport' White Paper. The 1998 Review led to a cut back on the road-building programme. However, slow progress on developing alternatives and political opposition to measures aimed at increasing the cost of motoring led to shift in policy, and consequently in 2000 the 10-Year Plan proposed to add some 500 lane km of roadspace. Following this, additional schemes were included in the programme in the 'Future of Transport' White Paper, which represented an extra 900 lane km of capacity to be provided by 2010, and over 4,000 lane km by 2025. Although other Government policies are reputedly aimed at restraining car use, the additional trunk road capacity that it to be provided will inevitably lead to a continued rate of growth in traffic, at a rate higher level than had been envisaged by previous policies.
- 5.2 The forecasts of traffic growth given in the 'Future of Transport' White Paper were understandably higher than those in the 10-Year Plan. However, this is not only because of the additional highway capacity proposed in the White Paper, but also due to changes in modelling assumptions, which are described in **Chapter 2** above. The White Paper foresees a growth of 26% over the period 2000-2010, compared with the 17% predicted by the 10-Year Plan. This is faster than predicted by the 10-Year Plan even if no policy measures had been put in place to tackle traffic growth. However, growth in traffic overall between 2000 and 2004 was only 6.6%, less than predicted by the White Paper.
- 5.3 The 'Future of Transport' White Paper predicted that CO₂ emissions would be some 2 million (7%) tonnes per annum higher in 2010 than would have been the case under the situation predicted by the 10-Year Plan.
- 5.4 However, the forecasts of CO₂ emissions assume the target of a 25% reduction in emissions from new cars by 2008 in the Voluntary Agreement is achieved. The motor manufacturers themselves have recently clearly indicated that this voluntary target will not be met until at least 2018, and the European target of reducing average CO₂ emissions for new cars to 140g/km by 2008 will not be reached in the UK until 2021. The average emissions of carbon dioxide for new cars fell by only 1.2 per cent in 2005, well short of the industry target of a 5% p.a. reduction, and significantly below the more conservative 2.5% p.a. reduction assumed in the modelling underpinning both the 10-Year Plan and the White Paper.
- 5.5 Therefore, the forecasts issued by the Government for the increase in CO₂ emissions from road traffic may not be relied on, and are likely to significantly underestimate the actual increases that occur, regardless of the success or otherwise of policies designed to stem the rate of increase in traffic.
- 5.6 Overall, changes in the Government's forecasts and predictions relating to CO₂ emissions from road transport in the UK may be summarised as follows:
- The 1988 Trunk Roads Review and 'New Deal for Transport' White Paper cut back on road-building programme
 - Then in 2000, the 10-Year Plan proposed about an extra 500 lane km of additional roadspace.

- Following this, the 'Future of Transport' White Paper in 2004 planned another extra 900 lane km of roadspace to be built by 2010, rising to over 4,000 lane km by 2025.
- Although in part due to changes in modelling assumptions, the White Paper predicted traffic would grow between 2000 and 2010 by 9% more than it would have done under the 10-Year Plan.
- CO₂ emissions would be some 2 million (7%) tonnes per annum higher in 2010 due to the policies of the White Paper when compared with the 10-Year Plan.
- There is clear evidence to suggest that the assumptions underpinning the predictions of CO₂ emissions in the 10-year Plan and the White Paper were over-optimistic.

5.7 From examining the background to these forecasts, Steer Davies Gleave concludes that the Government's 'Targeted Programme of Improvements' to the national road network (TPI) and the modelling on which the effects on CO₂ emissions that the policies and proposals of the White Paper are totally unrelated. The increase in CO₂ emissions of 0.1 million MtC quoted in the 'Future of Transport', is a 'top-down' estimate, and is no guide at all to the actual impact of the TPI and other policies and proposals. This estimate of a 0.1 MtC increase was unchanged from that quoted by the 10-Year Plan, despite the White Paper proposing significantly more widening of roads. Also, as noted above, the modelling of both growth in traffic and CO₂ emissions in the 10-Year Plan and the White Paper are based on unrealistic assumptions, and may not therefore be relied upon.

The Climate Change Programme and Road Transport

5.8 The CCP) seeks to ensure that the UK meets the commitments made by signing the Kyoto Protocol by (inter alia) reducing greenhouse gas emissions overall by 12.5% below 1990 levels at a point between 2008 and 2012. The UK Government also has adopted the domestic goals of reducing CO₂ emissions overall by 20% below 1990 levels by 2010, and putting the UK on a path to cutting emissions by some 60% by about 2050, with real progress towards this by 2020.

5.9 To deliver this commitment, a Government Public Service Agreement (PSA) target on climate change (PSA 7) makes the achievement of the CCP targets noted above a joint responsibility of the DfT, DEFRA and the DTI. The PSA targets are meant to link allocation of public expenditure to the achievement of key national priorities, and PSA 7 was specifically added in the 2004 Spending Review 2004, which took effect from 1 April 2005.

5.10 As noted above in relation to forecasts, the Government sees the voluntary agreements on new car fuel efficiency between the European Commission and car-makers, which aim to improve the average fuel efficiency of new cars sold in the EU by 25 per cent by 2008-9 against a 1995 baseline as the most important element in achieving the projected reductions in emissions. However, as also noted above, the manufacturers have now clearly indicated that these will not deliver the reductions expected.

5.11 The fuel duty escalator, introduced in 1993, was also seen as an important element when forecasting the level of 2010 emissions. However, it was removed in 2000 and since then the level of fuel duties has been set on a budget-by-budget basis. The Government has estimated carbon savings by comparing the level of emissions with the fuel duty escalator in place with what would have happened had fuel duty been increased annually in line with inflation. However, this clearly will have no further

effects in the future.

- 5.12 The Government has also set some store by the reductions in CO₂ that may occur as a result of wider transport measures, which imply a shift from car to other modes of transport. However, although the use of rail continues to increase, bus patronage, cycling and walking all continue to decline presently. There is also no evidence to suggest that the increase in rail patronage has occurred due to modal shift rather than additional trips generated by economic growth. The most recent Government statistics indicate that car use has continued to increase as disposable income has risen, against a backdrop of little change in the real cost of motoring and rising real costs of public transport fares. The number of bus journeys outside London has continued to decline, although rail travel has increased by over 40% over the last 10 years. However, there is clear evidence that the number of trips made and distance travelled increase with income.
- 5.13 Overall, Steer Davies Gleave believes that the likely effectiveness of the measures set out in the CCP for meeting the targets that the Government has adopted or set itself must be questionable. The technical and fiscal measures envisaged are not being effective, or have been withdrawn. Without this, the transport policy measures were never likely to be particularly effective on their own, given the strength of underlying factors that affect travel, such as economic growth, the increase in personal disposable incomes, and the decreasing cost of motoring compared with public transport. On this basis, Steer Davies Gleave has calculated a mid-range estimate of total CO₂ emissions from transport to 2025 would cause environmental damage to the economic value of £30.9 billion. In addition, if the Government's policies are less effective than estimated, a further £10.6 billion worth of damage may be caused.

Recommendations

- 5.14 This study has highlighted the uncertainties surrounding the Government's projections and forecasts of the growth of CO₂ emissions from transport, and the likely effectiveness of the Government's main policy initiatives in this area, as set out in the CCP. To address these issues and support the achievement of the Government's objectives, Steer Davies Gleave recommends:
- The DfT should develop a more robust and transparent approach to the monitoring of the carbon effects of policies and proposals, particularly the Highways Agency's Targeted Programme of Improvements. This should include more positive steps to better understand the consequences of its roads policies and programmes in terms of their effect on CO₂ emissions, and to identify such effects sufficiently early in the development of these so that they can better inform this process and positively affect policy outcomes.
 - More rigorous and effective enforcement of the 70 mph speed limit, or even reducing this to 60 mph. This appears to be a particularly efficient way of potentially reducing CO₂ emissions, which according to the DfT's own figures could be as effective as all the other transport measures set out in the 10-year plan and 'Future of Transport' White Paper put together. This view is confirmed by other research that suggests the effects may be even more beneficial.
 - Policies based on 'Smarter Choices' should be more rigorously pursued and supported at the local level. This could provide a significant reduction in the projected growth of traffic, in line with the 16% contribution to the emissions saved from transport in 2010 that the Government has estimated.
 - The DfT should better develop ways in which the transport policies and proposals that may be put forward at a local level could be framed in order to lessen the rate of growth in emissions, or indeed even reduce them. However, these will

need to be developed as part of a coherent and targeted strategy, and in the longer-term measures to reduce the need to travel through better integration of transport and land use planning, and a focus on access to facilities rather than mobility as an end in itself will be necessary.

- The Government should set sectoral targets for the reduction of CO₂ emissions relating to different parts of the economy such as transport through the CCP, and spatial targets should also be set on regional basis.

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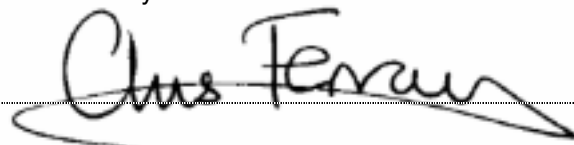
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